

Final Exam

Chemistry 3331

December 11, 2013

PLEASE CIRCLE CLASS TIME

10:00 AM

1:00 PM

Name (PRINT)

Last, First

Signature

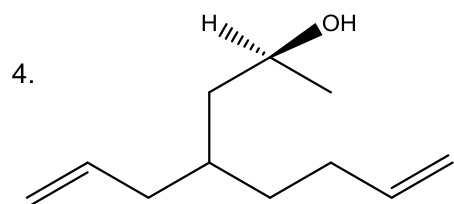
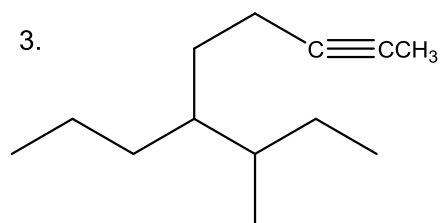
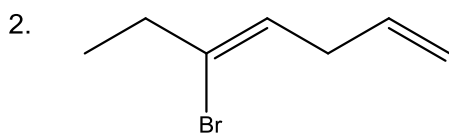
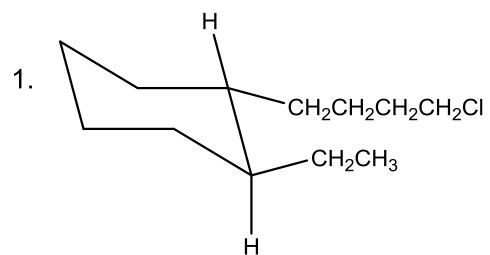
ID #

NOTE: Present your ID when you return the exam booklet

Made By Rana Shmmas
ranashmmas93@yahoo.com

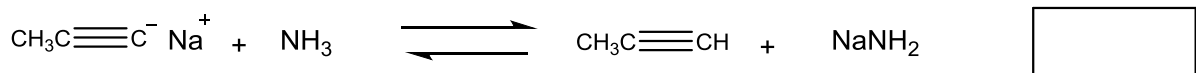
A. Nomenclature: (12 points)

Give an acceptable IUPAC name for each compound. Be sure to indicate the **stereochemistry** where appropriate.

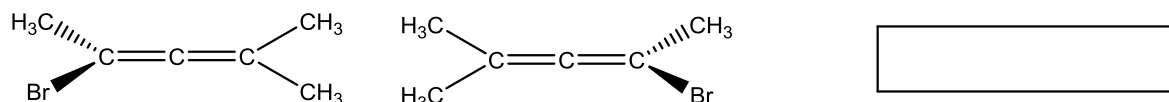


B. Facts: 22 points

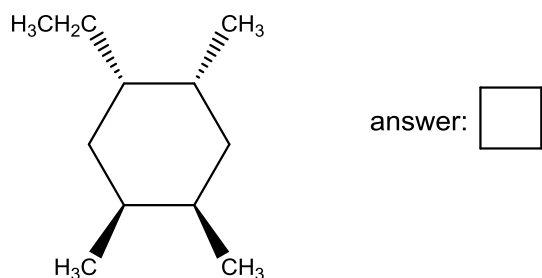
1. Does the following equilibrium lie to the Left or the Right? (2 pts.)



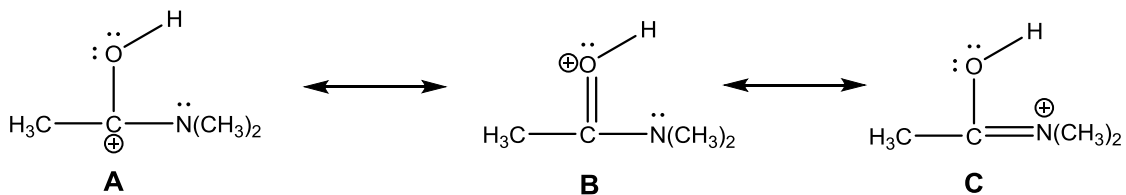
2. Label the following pair as identical, structural isomers, enantiomers, or diastereomers. (3 pts.)



3. Consider the substituted cyclohexane below. In the more stable chair conformation, how many methyl groups are in equatorial positions? (3 pts.)



4. Consider the resonance contributors below.



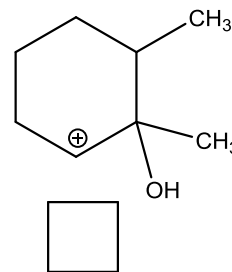
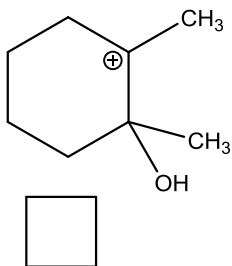
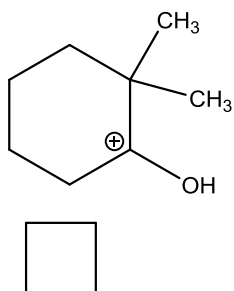
a. Place the letter of the major contributor in the box. (2 pts.)

b. Place the hybridization of the oxygen and nitrogen atoms in the appropriate box. (2 pts.)

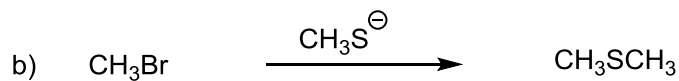
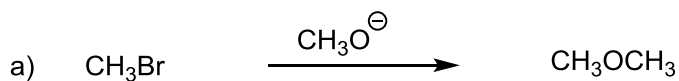
oxygen atom:

nitrogen atom:

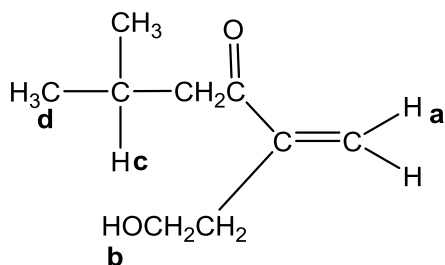
5. Place the following cations in order of increasing stability. (1=least stable, 3=most stable) (3 pts)



6. Compare the reaction rates of reaction **a)** and reaction **b)**, and place the letter of the faster reaction in the box. (2 pts.)



7. Answer the following questions for the molecule shown below and place the answers in the appropriate box. (i) How many distinct proton types are present in the molecule? (ii) Under ultrapure condition, what are the theoretically predicted multiplicities (splitting patterns) of the signals for the protons labeled **a**, **b**, **c**, and **d**? (5pts)



(i) number of distinct protons

(ii) multiplicity of H_a

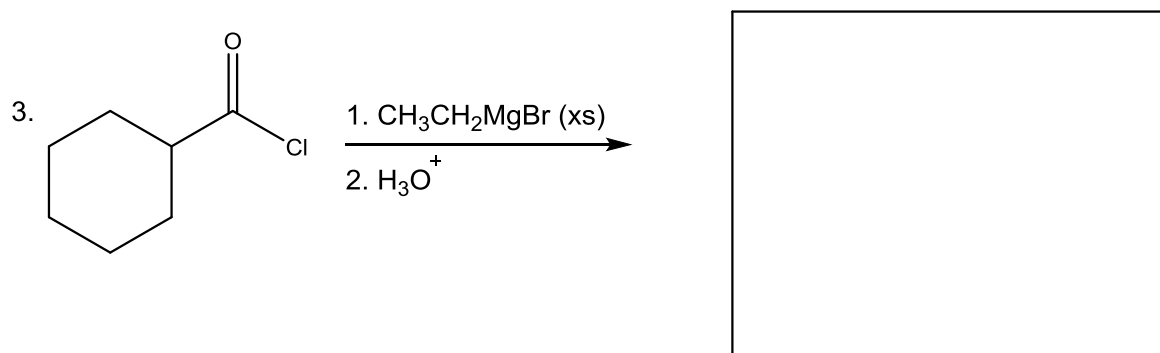
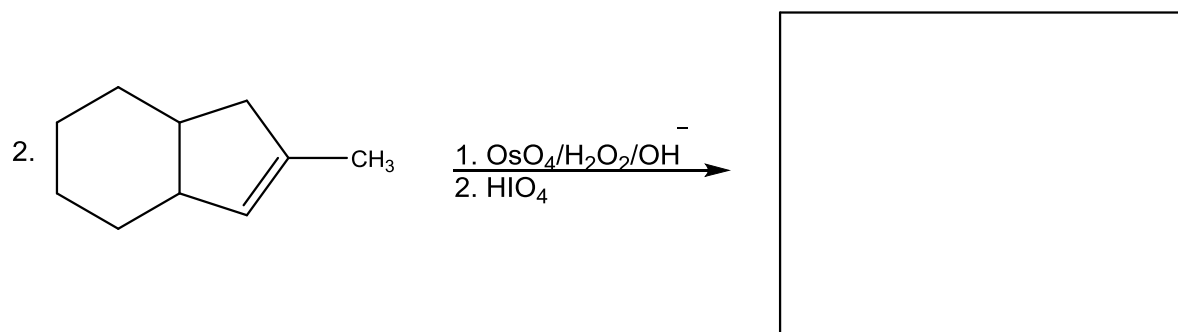
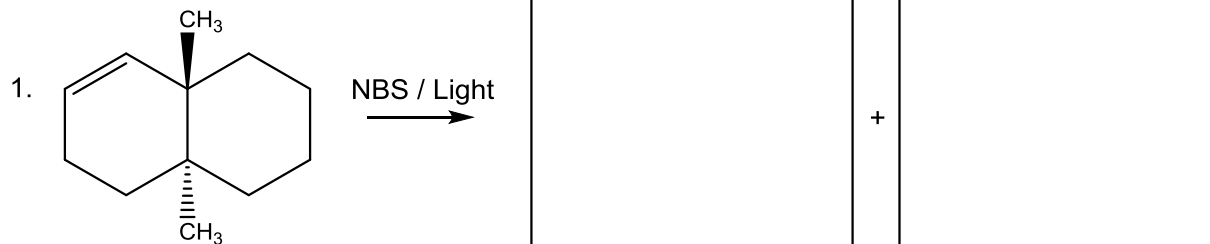
multiplicity of H_b

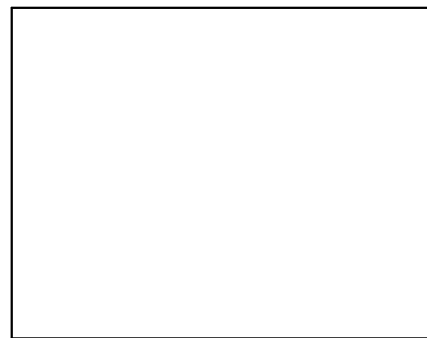
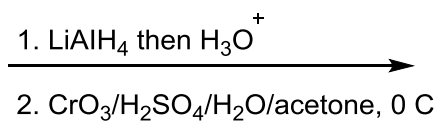
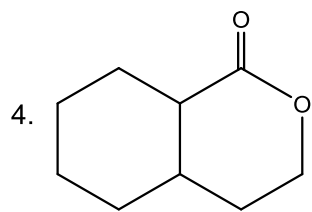
multiplicity of H_c

multiplicity of H_d

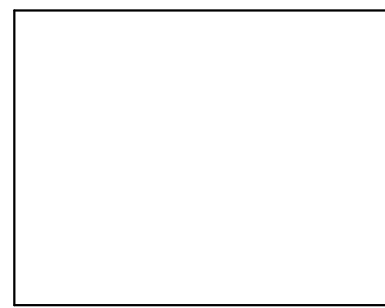
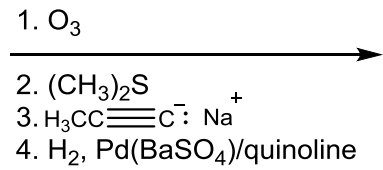
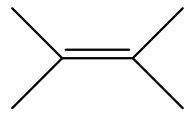
C. Reactions: Total = 36 points, 4 points each

Please provide the major product unless otherwise indicated in the answer box. Be sure your drawing indicates stereochemistry if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

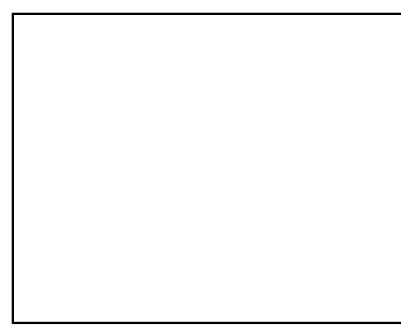
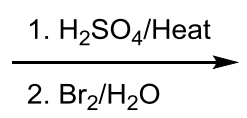
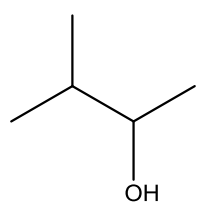


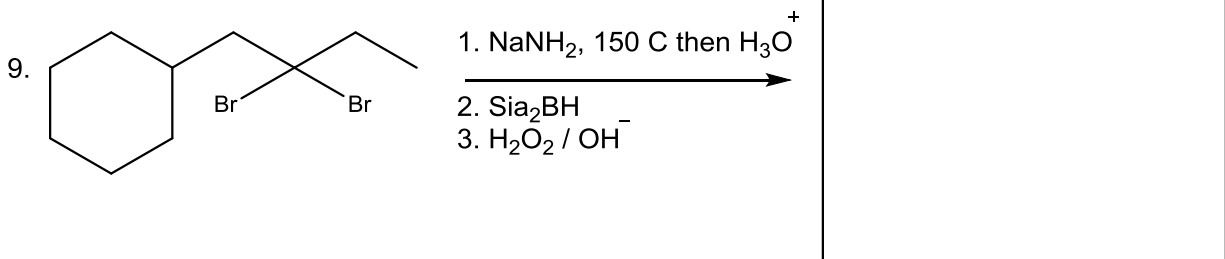
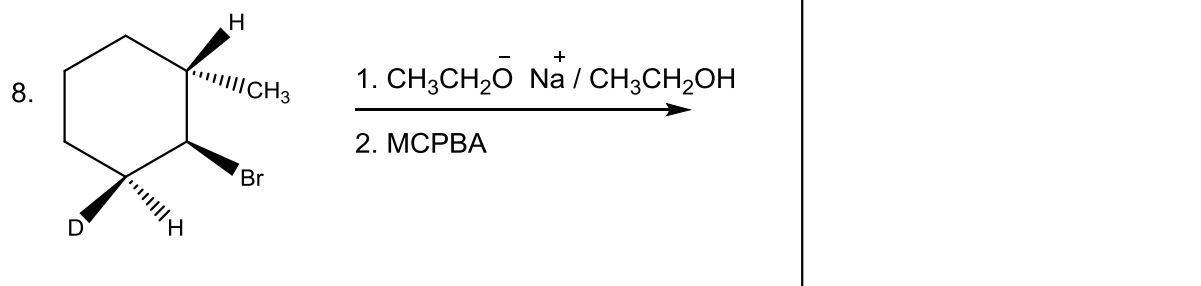
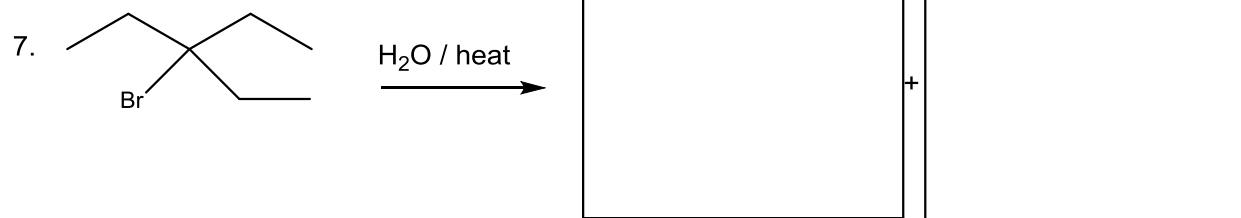


5.



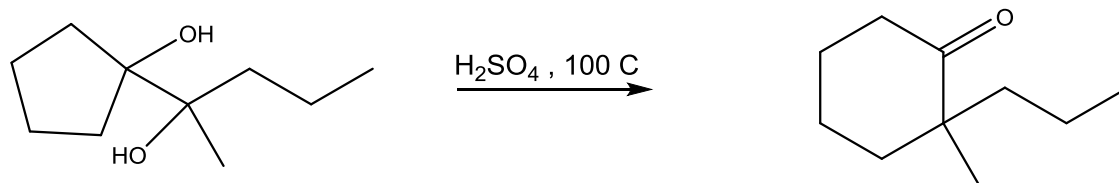
6.





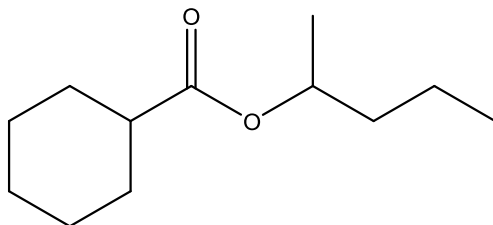
D. Mechanisms: 10 points

Provide a clear mechanism to explain the formation of the product shown. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. Show all intermediates and all formal charges. **If more than one resonance contributor is possible, be sure to show the more stable contributor.**



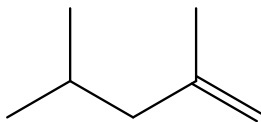
E. Synthesis: 10 points

Synthesize the molecule below using any of the following reagents: **cyclohexane, alcohols of three carbons or less**, any inorganic reagents, and any oxidizing or reducing agents.

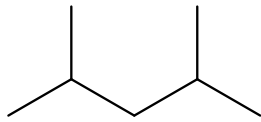


F. Spectroscopy: 10 points

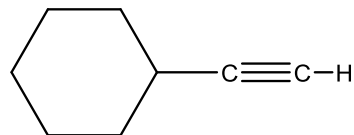
1. Carefully examine the two infrared spectra and the compounds below. Place the letter of the compound in the box beside its spectrum. (4pts)



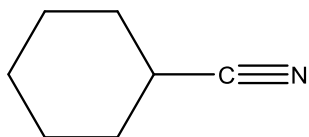
A



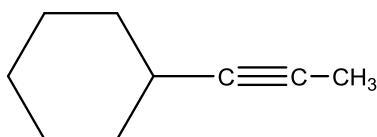
B



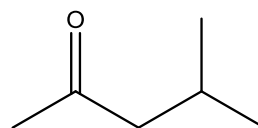
C



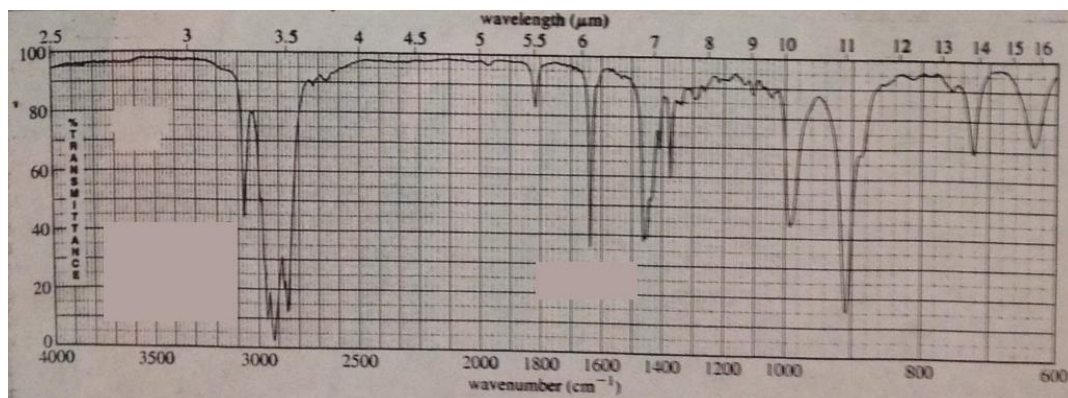
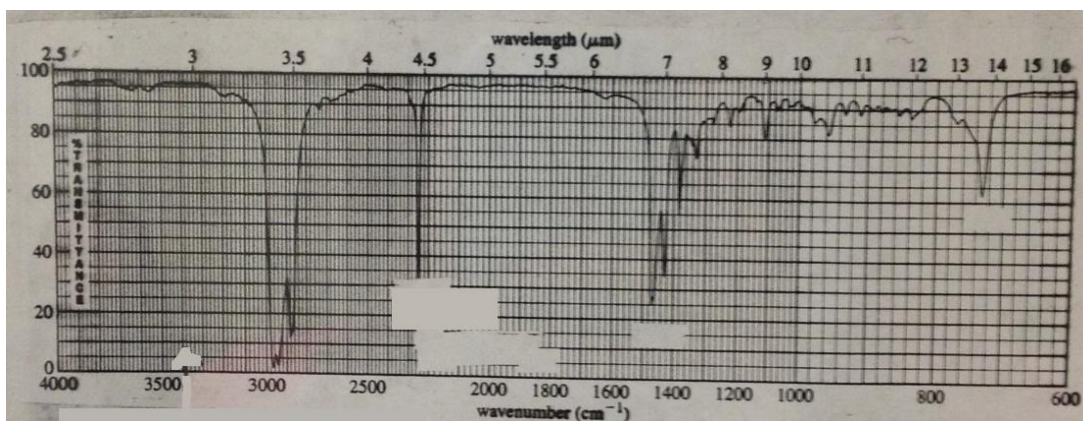
D



E



F



2. A compound with the formula $C_{10}H_{12}O$ exhibits the IR and 1H NMR shown below. Please identify this compound and draw the structure in the box provided below. (6 pts.)

